

State of Illinois  
Department of Transportation

**CONSTRUCTION INSPECTOR'S CHECKLIST  
FOR  
PILING**

This checklist has been prepared to provide for the field inspector a summary of easy-to-read step-by-step requirements for the installation and inspection of foundation piling ([Section 512](#)). The following questions are based on the requirements found in the Standard and Supplemental Specifications, Highway Standards and appropriate sections of the Construction Manual.

Have you checked the contract Special Provisions, Supplemental Specifications and plans to see if any modifications have been made to the Standard Specifications and the requirements listed herein? \_\_\_\_\_

**1. PLAN AND SPECIFICATION REVIEW**

Prior to starting work on an item, have you checked the contract Special Provisions and plans to see if any changes or modifications have been made to the Standard and Supplemental Specifications? \_\_\_\_\_

On bridge construction and reconstruction contracts have you checked the proposed or existing span lengths prior to starting work? (The contract may make this the responsibility of the Contractor.) \_\_\_\_\_

On bridge construction and reconstruction contracts have you checked the existing or proposed vertical or horizontal clearances? \_\_\_\_\_

Prior to the start of construction, have you checked the plan elevations of the bottom of footings, intermediate substructure components and bearing seat elevations of abutments and piers to ensure they correspond to the appropriate top of deck elevations and dimensions shown on the superstructure plans? \_\_\_\_\_

Have you reviewed the appropriate Sections of the Construction Manual (Structures), Construction [Memorandum No. 44](#), [Documentation Section](#), [Project Procedures Guide](#) and [Forms](#)? \_\_\_\_\_

Has the structure been surveyed to establish the baseline of the structure, bearing lines of piers and backs of abutments? Has an independent check of your calculations and layout been performed before the Contractor starts work? (Construction Manual [Survey Section](#)) \_\_\_\_\_

**2. DETERMINATION OF ENERGY REQUIREMENTS**

Have you determined what type of pile hammer will be used? \_\_\_\_\_

Does the hammer meet the following energy requirements for the type of pile to be driven: \_\_\_\_\_

- a. Hammers for Timber Piles.\* (512.10(d) & Construction Manual [Section 512.10](#))

## Gravity Hammers

Plan Bearing	Ram Weight	
142 kN (16 tons) or less	9 kN (2000 lbs)	_____
151 kN (17 tons) to 178 kN (20 tons)	11 kN (2500 lbs)	_____
187 kN (21 tons) to 222 kN (25 tons)	13.3 kN (3000 lbs)	_____

Note: At the time capacity is being determined, the height of fall of the hammer, H, shall be held between 4.3 m (14 ft.) and 4.8 m (16 ft.)

Steam, Air or Diesel Hammers:

Rated Energy must be equal to or greater than 8100 J (6000 ft lbs)/blow.

- b. Hammers for Precast and Precast Prestressed Concrete Piles. \*The hammer must be steam, air or diesel. The hammer must develop an energy per blow sufficient to achieve the required pile capacity with not more than 10 blows per 25 mm (inch) at the final set. (120 blows/300 mm) (1 ft) (512.10(e) & Construction Manual [Section 512.10](#)) \_\_\_\_\_
- c. Hammers for Metal Shell Cast-in-Place Concrete Piles. \*The hammer must be steam, air or diesel. The hammer must develop an energy per blow sufficient to achieve the required pile capacity with no more than 10 blows per 25 mm (inch) at the final set. (120 blows/300 mm) (1 ft). (512.10(f) & Construction Manual [Section 512.10](#)) \_\_\_\_\_
- d. Hammers for Steel "H" Piles.\* The hammer must be steam, air or diesel. The hammer must develop an energy per blow of not less than:
  - \* Hydraulic hammers may be used with the written approval of the Engineer. If allowed the Contractor shall furnish, at his/her expense, wave equation analysis and a pile driving analyzer to aid in the determination of the adequacy of the hammer and the bearing capacity of the pile. 512.10(g)

## Minimum Rated Energy

Single acting or Steam, Air or Open type diesel hammers:  $WH = 35P$   
( $WH = 0.1P$ ) \_\_\_\_\_

Double Acting Steam, Air, or Closed Type Diesel Hammers:  $E = 35P$   
( $E = 0.1P$ ) \_\_\_\_\_

Where: E = Energy in Joules (foot pounds) per blow of the striking parts of the hammer.

H = Height of fall in millimeters (feet)

P = Safe allowable bearing values of piles in kiloNewtons (pounds) when driven vertically. For piles driven to design capacity, use capacity from plans in kiloNewtons (pounds). For piles specified to be driven to refusal, use  $P = 1.5(9,000 \times \text{square inch pile cross section})$  [ $P = 1.5 (0.062 \times \text{mm}^2 \text{ pile cross section})$ ] W = Weight of striking parts of hammer in kiloNewtons (pounds).

### 3. **DETERMINATION OF BEARING VALUES**

Have you determined from tables or calculations the required blows/300mm (blows/foot) "n", for the pile capacities shown on the plans? \_\_\_\_\_

$$\frac{(12\text{in} / \text{ft})}{(\text{Sin} / \text{blow})} \quad n = \frac{300\text{mm} / 300 \text{ mm}}{\text{Smm} / \text{blow}}$$

Where S is determined by formula. 512.14(b)

### 4. **TEST PILES**

When test piles are specified, are the following requirements being met:

- a. Location. Test piles shall be located in footings designated in the plans. \_\_\_\_\_

Within the designated footing, are you locating the test pile as far as possible away from the nearest soil boring? \_\_\_\_\_

Test piles driven in a permanent location shall be cut off as permanent piles. Steel test piles driven in a permanent location shall be painted when painting is specified for the permanent steel piles. Test piles not driven as permanent piles shall be cutoff or pulled as directed by the Engineer. (512.15) \_\_\_\_\_

- b. Driving Elevation Keep the excavation at the test pile location completed to an elevation no more than 60 mm (2 ft) above the plan bottom of footing elevation? (512.15) \_\_\_\_\_

Refusal and point bearing piling may be driven from any elevation. (512.15) \_\_\_\_\_

- c. Pile Material. Is the test pile the same material and size as specified for the permanent piles? (512.15) \_\_\_\_\_

If metal shoes are specified for the permanent piles, is the test pile driven with the required metal shoe? \_\_\_\_\_

- d. Length. Is the test pile 3 m (10 ft) longer than the length of the permanent piles shown on the plans? (512.15) \_\_\_\_\_

- e. Hammer. The hammer used to drive the test pile shall be the same hammer that will be used to drive the permanent pile. (512.15) \_\_\_\_\_
- f. Notification. Are you notifying the District Office prior to driving the test pile? \_\_\_\_\_
- g. Bearing. For friction piling, is the test pile being driven to a capacity = 1.5 x plan capacity? (512.15) \_\_\_\_\_
- Are refusal piles being driven to refusal bearing? (512.15) \_\_\_\_\_
- Are bearing values being determined by appropriate formulas? (512.14(b)) \_\_\_\_\_
- Does the pile penetrate at least 3 m (10 ft) below the bottom of footing elevation or 3 m (10 ft) below undisturbed earth? (512.11) \_\_\_\_\_
- h. Records. Are the test piles marked off in 300 mm (1 ft) increments and the blows per 300 mm (1 ft) foot recorded on Form [BC 757](#), Test Pile Driving Record, for each 300 mm (1 ft) of test pile driven? (512.15) \_\_\_\_\_
- i. Length Determination. Are the lengths of the permanent piles being determined from the test pile data and is the Contractor being furnished a written itemized list of pile lengths to be ordered? Is a copy of this list being retained in the contract documentation files? (512.16) \_\_\_\_\_

## 5. **STORAGE AND HANDLING**

- a. Timber Piles. Are the timber piles treated in accordance with the requirements of 1007.08 when required? \_\_\_\_\_
- Are the piles being stored off the ground with wooden supports? \_\_\_\_\_
- Are the piles being handled with rope slings and in accordance with Article 507.05(a) and 1007.12(f)? \_\_\_\_\_
- b. Concrete Piles. Are precast and precast prestressed concrete piles being lifted and stored at the bridle points shown on the plans? 512.08(c) \_\_\_\_\_
- Are metal shells being stored off the ground and in a manner to prevent dirt, water or other foreign material from entering the shell? \_\_\_\_\_
- Are metal shells being stored on sufficient wood cribbing to prevent bending, distortion or other damage to the shell? \_\_\_\_\_
- c. Steel piles. Are steel H-piles being supported on skids or other supports sufficiently spaced to prevent distortion or other damage due to deflection? (512.08)(d) & Construction Manual [Section 512.10](#) \_\_\_\_\_

**6. PREPARATION FOR DRIVING**

- a. Prior to the start of driving piling, has the footing been excavated to grade? \_\_\_\_\_
- b. Have cross sections been taken to determine pay quantities for structure excavation? \_\_\_\_\_
- c. Have the pile locations been staked and checked? \_\_\_\_\_
- d. If Precast Concrete Piles have been allowed to dry after curing, has the entire pile been kept saturated at least six hours prior to driving? (512.09(b)) \_\_\_\_\_
- e. If pre-coring of the embankment is specified on the plans, are you calculating the coring length based on existing ground elevations? (512.10(c)) \_\_\_\_\_

**7. PILING FIELD BOOK**

Are you preparing a hardback field book so that a permanent record can be made of the following: (Construction Manual [Section 512.11](#)) \_\_\_\_\_

- a. A numbered diagram of the location of piles in each footing. \_\_\_\_\_
- b. The authorized length to be furnished as per the written itemized list provided to the Contractor. \_\_\_\_\_
- c. The actual measured length of piling delivered. \_\_\_\_\_
- d. The length of cutoff (top of pile elevation -- cutoff elevation) \_\_\_\_\_
- e. The length driven (length of pile furnished-- cutoff length) \_\_\_\_\_
- f. The plan bearing capacity and corresponding calculated blows per 300 mm (foot) values. \_\_\_\_\_

**8. MATERIAL INSPECTION**

- a. Have you inspected all piling to see if they have been approved prior to shipment? (Construction Manual [Section 512.08](#)) \_\_\_\_\_
- b. Are you inspecting piling delivered for possible damage in transit? \_\_\_\_\_
- c. If metal shoes are specified for H piles, do they meet the requirements of (512.05(e))? \_\_\_\_\_

**9. EQUIPMENT**

- a. Is the equipment for driving piles adequate for the driving of piles at least 3 m (10 ft) longer than the longest length shown on the plans? (512.10) \_\_\_\_\_

- b. Are the heads of all piles being protected with a suitable cap, helmet or driving head? (512.10(b)) \_\_\_\_\_
- c. Is the pile and hammer being held in accurate alignment with pile driver leads which are blocked in position on the pile? (512.10(h)) \_\_\_\_\_

#### 10. **TOLERANCES IN DRIVING**

- a. Are foundation piles being driven with a variation from the vertical or from required batter of not more than the following: (512.12) \_\_\_\_\_
  - (1) Timber piles = 6 mm/300 mm ( $1/4$  in./ft) \_\_\_\_\_
  - (2) Concrete, steel and shell piles = 3 mm/300 mm ( $1/8$  in./ft) \_\_\_\_\_
- b. Piles supporting caps =  $\pm$  25 mm (1 in) at cap and  $\pm$  50 mm (2 in) at the bottom of backing or bracing or the ground line. \_\_\_\_\_

#### 11. **PENETRATION REQUIREMENTS**

- a. Are you observing the blow/300 mm (ft) count to make certain that all piles are driven to at least the plan bearing capacity? The Contractor will not be required to drive piles to a bearing value of more than 45 kN (5 tons) on any pile in excess of the bearing value required by the plans. (512.11) \_\_\_\_\_
- b. Is the penetration of all foundation piles at least 3 m (10 ft) below the bottom of footing? (512.11) \_\_\_\_\_
- c. Is the penetration of all other piles at least 3 m (10 ft) into undisturbed earth? (512.11) \_\_\_\_\_

Note: If you are having problems achieving this penetration with timber piles, are you asking the Contractor to point the piles? (512.09(a)) Jetting with water and/or air jets can be used in combination with the hammer to achieve minimum pile penetration. (512.10(j))

- d. Are piles in stream beds or on banks of streams, where erosion or scour is expected, driven to such a penetration as the Engineer deems necessary as protection against scour? (512.11) \_\_\_\_\_

#### 12. **FIELD SPLICING OF PILES**

When it becomes necessary to splice onto a partially driven pile because it has become damaged in driving or because plan bearing has not yet been reached, are the following procedures being used in making the splice? \_\_\_\_\_

- a. Timber Piles. The added piece shall be cut flush with and attached to the main pile with the use of at least 4 steel plates or a metal pipe sleeve. (512.06) \_\_\_\_\_

- b. Precast or Precast Prestressed Concrete Piles. Continue driving past cutoff elevation until bearing is obtained. Cut away enough pile until reinforcing steel of 30 bar diameters for precast concrete piles or 600 mm (24 in) of prestressing strand for precast prestressed concrete piles is exposed. Lap on additional bars, form up the extension, moisten and cover the pile top with a 1:2 cement mortar and pour the "built-up." (512.03(c)) \_\_\_\_\_
- c. Steel "H" Piles. The added piece may be attached by welding two web plates and two flange plates across the splice. The position, size and welding of the plates will be as specified in the detail on file in the District Construction Office. The welder making the splice must be qualified by test for welding fillet welds in accordance with Construction [Memorandum No. 44](#) prior to being permitted to weld. This test may be conducted on the jobsite and inspected by a person knowledgeable of welding requirements. (512.05(b)) \_\_\_\_\_

The Champion BP-30000 commercial splicer is approved for HP steel piling. This splicer requires the flanges to be welded together with a full penetration butt weld. \_\_\_\_\_

The welder making any full penetration butt weld must be qualified by test on the steel to be welded in accordance with the qualification requirements of the American Welding Society (AWS) Standard Specifications (Certification by independent test laboratory required). \_\_\_\_\_

Another acceptable method is to groove the ends of both sections and join them by a full penetration butt weld provided the welder is qualified for full penetration butt welds as above. \_\_\_\_\_

- d. Metal Shell Piles. Welding will be permitted for splicing metal shells. (See plan details) The welder need not be qualified. The Advance S-18000 commercial pile splicer sleeve is approved for use on metal shell piling only in footings. It will not be permitted in pile bents unless prior approval is obtained from the Bureau of Bridges and Structures. (512.04(a)) \_\_\_\_\_

Note: The plans must be checked for additional requirements for pile splicing due to seismic loading potential. Proposed splices above the footing must meet the requirements of Construction [Memorandum No. 44](#).

### 13. **PILE CUTOFFS**

- a. Are you marking each driven pile with a mark at cutoff elevation so that the Contractor can cut them off square? (512.13) \_\_\_\_\_
- b. Once you determine that the pile cutoffs will not be needed as splices for any of the other permanent piles, are you informing the Contractor that the cutoffs are theirs and are to be disposed of at no additional expense to the State? (512.13) \_\_\_\_\_

- c. If the Contractor wishes to furnish metal shell or steel piles made up with spliced pieces, is the required material certification being provided and do the spliced pieces conform to the following? \_\_\_\_\_
- (1) Metal Shells Shortest piece allowed = 3 m (10 ft); maximum pieces/pile = 3. (512.04(a)) \_\_\_\_\_
- (2) Steel Piles. No splice will be permitted in piles less than 8 m (25 ft) long and not more than one splice will be permitted in any piles less than 12 m (40 ft) long. (512.05(b)) \_\_\_\_\_

**14. INSPECTION OF SHELLS AFTER DRIVING**

- a. Are you inspecting the interior of all driven metal shells for bends or other deformations that would impair the strength of the pile with a Contractor-supplied lamp or mirror? (512.04(b)) \_\_\_\_\_
- b. After you have inspected and approved the shells, is the Contractor temporarily sealing the top of the shells to prevent the entrance of water or foreign substance? (512.04(b)) \_\_\_\_\_

**15. FILLING SHELLS WITH CONCRETE**

- a. Just prior to filling metal shell piles with Class SI Concrete, are you inspecting the interior with a mirror or lantern to be sure that all water and foreign substance has been removed? (512.04(d)) \_\_\_\_\_
- b. If reinforcement is specified on the plans, is the reinforcement rigidly fastened together and lowered into the shell before placing concrete? Are spacers used to maintain the proper clearance into the top of the piles? (512.04(c)) \_\_\_\_\_
- c. When filling the shells with concrete, is the concrete being consolidated with internal vibration for the entire length? (512.04(d)) \_\_\_\_\_
- d. If all piles in a bent, pier or abutment cannot be driven before any concrete is placed in the shells, is driving of the remaining piles being deferred until the concrete in the shells is at least 24 hours old? (512.04(d)) \_\_\_\_\_

**16. BACKFILLING OVERSIZED PRECORED HOLES**

If oversized holes are drilled in embankments, are they being backfilled with dry loose sand after the piles are driven? (512.10(c)) \_\_\_\_\_

**17. PILING DIAGRAM**

Is a Piling Diagram for each footing being prepared for submittal with the Final Payment Estimate? Is it being prepared from your piling field book and does it contain the following items? See [Section 512.11](#) of the Construction Manual. \_\_\_\_\_

- a. Diagram showing number and spacing of piles driven. \_\_\_\_\_



- b. Awarded, furnished, cutoff and driven lengths. \_\_\_\_\_
- c. Final penetration/blow, type and weight of hammer used, height of drop and bearing capacity. \_\_\_\_\_

**18. DOCUMENTATION OF FINAL CONTRACT QUANTITIES**

TEST PILES - Each  
METAL SHOES - Each

Shall be paid for at the contract unit price each. Enter in Quantity Book by date and location. \_\_\_\_\_

FURNISHING PILES (Of the various types specified) - Linear Meters (Linear Feet)

Payment will be made for the total lineal meters(feet) of all piles delivered to the work in accordance with the itemized list furnished by the Engineer. Field measurements must be on record in a field book. \_\_\_\_\_

If cutoffs are used in splicing on additional lengths, no extra length compensation will be allowed. \_\_\_\_\_

Other authorized field additions or "build-ups" will be allowed for payment. \_\_\_\_\_

For timber pile, if the Engineer specifies furnished lengths other than what you have contract prices for, the table in Article 512.18(a) shall be used for determining an adjusted furnished price. \_\_\_\_\_

DRIVING PILES (Of the various types specified) - Linear Meters (Linear Feet)

Payment will be made for the total linear meters (linear feet) of all piles left in place below cutoff elevation. Field measurements must be on record in a field book. \_\_\_\_\_

Authorized splices will be paid for as extra work in accordance with Article 109.04. Use Form [BC 635](#) to document this work. \_\_\_\_\_

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